CLAIMS

1. A method of regulating quorum sensing in bacteria comprising modulating the activation by a signalling molecule of LuxR or a homologue thereof.
2. A method according to claim 1 wherein activation of LuxR or a homologue of LuxR by a signalling molecule is prevented.
3. A method according to claim 1 or claim 2 wherein said bacteria are Gram negative.
4. A method according any of claims 1 to 3 wherein said homologue of LuxR is selected from the list consisting of AhlR, AhyR, AsaR, BafR, BisR, BpsR, BviR, CarR, CepR, CerR, CinR, CsaR, CviR, EagR, EcbR, EchR, EsaR, ExpR, HalR, LasR, LuxS, Mll8752, MupR, PcoR, PhzR, PmlR, PpuR, PsmR, PsyR, RaiR, RhiR, RhlR, SdiA, SdiR, SmaR, SolR, SpnR, SprR, SwrR, TraR, TriR, TrlR, TrnR, VanR, VsmR, Y4qH, YenR, YpeR, YpsR, YruR, YtbR and YukR.
5. A method according to any of claims 1 to 4 wherein the signalling molecule is a N-acylated homoserine lactone.
6. A method according to any one of claims 1 to 5 wherein the binding of a ligand prevents the LuxR or homologue of LuxR from being activated by its signalling molecule.
7. A method according to claim 6 wherein said ligand is an antibody.
8. A method according to claim 7 wherein said antibody is a monoclonal antibody.
9. An antibody that immunoreacts with LuxR or a homologue of LuxR between amino acid residues 19 and 80.
10. An antibody according to claim 9 wherein said antibody immunoreacts with LuxR or a homologue of LuxR between amino acid residues 19 and 31.
11. An antibody according to claim 9 or claim 10 which immunoreacts with the sequence TCNNNKDINQC.
12. An anti-idiotypic antibody that binds to an antibody according to any one of claims 9 to 11.
13. An antibody according to any of claims 9 to 12 conjugated to a detectable label.
14. An antibody according to claim 13 wherein said label is a radioisotope, a fluorescent molecule, a heavy metal molecule or an enzyme.

15. A pharmaceutical composition comprising LuxR, a homologue of LuxR, a fragment of LuxR, a fragment of a homologue of LuxR or a nucleic acid encoding one of these polypeptides, or an antibody according to any one of claims 9 to 14.

16. A vaccine composition comprising LuxR, a homologue of LuxR, a fragment of LuxR, a fragment of a homologue of LuxR, a nucleic acid encoding one of these molecules or a quorum sensing signalling molecule.

17. A vaccine composition according to claim 16 wherein said quorum sensing signalling molecule is a N-acylated homoserine lactone.

18. A vaccine composition according to claim 16 or claim 17 further comprising a pharmaceutically acceptable diluent or carrier.

19. A vaccine composition according to any one of claims 16 to 18, further comprising an adjuvant.

20. LuxR, a homologue of LuxR, a fragment of LuxR or a homologue of LuxR, a nucleic acid encoding one of these polypeptides, an antibody according to any one of claims 9 to 14, a pharmaceutical composition according to claim 15, or a vaccine composition according to claims 16 to 19 for use as a medicament.

21. Use of LuxR, a homologue of LuxR, a fragment of LuxR or a homologue of LuxR, a nucleic acid encoding one of these polypeptides, an antibody according to any one of claims 9 to 14, a pharmaceutical composition according to claim 15, or a vaccine composition according to claims 16 to 19 in the manufacture of a medicament for the treatment of disease in which quorum sensing is implicated.

22. Use of LuxR, a homologue of LuxR, a fragment of LuxR or a homologue of LuxR, a nucleic acid encoding one of these polypeptides, a ligand, an antibody according to any one of claims 9 to 14, a pharmaceutical composition according to claim 15, or a vaccine composition according to claims 16 to 19 for sensitising an antibiotic resistant bacterium to an antibiotic.

23. Use of LuxR, a homologue of LuxR, a fragment of LuxR or a homologue of LuxR, a nucleic acid encoding one of these polypeptides, a ligand, an antibody according to any one of claims 9 to 14, a pharmaceutical composition according to claim 15, or a vaccine composition according to claims 16 to 19 in the manufacture of a medicament for sensitising an antibiotic resistant bacterium to an antibiotic.

24. Use of LuxR, a homologue of LuxR, a fragment of LuxR or a homologue of LuxR, a nucleic acid encoding one of these polypeptides, a ligand, an antibody according to any one of claims 9 to 14, a pharmaceutical composition according to claim 15, or a vaccine composition according to claims 16 to 19 in the manufacture of a medicament for the treatment of a disease in which quorum sensing is implicated wherein the patient suffering from that disease is refractive to antibiotic therapy.

25. Use of LuxR, a homologue of LuxR, a fragment of LuxR or a homologue of LuxR, a nucleic acid encoding one of these polypeptides, a ligand, an antibody according to any one of claims 9 to 14, a pharmaceutical composition according to claim 15, or a vaccine composition according to claims 16 to 19 in the manufacture of a medicament for the treatment of a disease in which quorum sensing is implicated wherein the medicament is administered in conjunction with an antibiotic.

26. Use of an antibiotic in the manufacture of a medicament for the treatment of a disease in which quorum sensing is implicated wherein the subject being treated is pre-administered with a pharmaceutical composition or vaccine according to the invention.

27. The use of claim 21 wherein disease is caused by *Bacillus subtilis*, *Streptococcus pneumoniae*, *Staphylococcus aureas*, *Vibrio salmonicida*, *Aeromonas hydrophila*, *Burkhoderia ambifaria*, *Burkholderia pseudomallei*, *Burkholderia mallei*, *Burkholderia stabilis*, *Burkholderia vietnamiensis*, *Burkholderia multivorans*, *Escherichia coli*, *Serratia marcescens*, *Salmonella typhi*, *Brucella suis*, *Brucella melitensis*, *Yersinia ruckeri*, *Hafina alvei*, *Shigella flexneri*, *Serratia liquefaciens*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*, *Burkholderia cepacia*, *Pseudomonas fluorescens*, *Providencia stuartii*, *Klebsiella aerogenes*, *Yersinia pestis*, *Yersinia enterocolitica* or *Yersinia pseudotuberculosis*.

28. The use according to any one of claims 21 to 27 wherein said disease is Crohn's disease or Cystic Fibrosis, cellulites and ecthyma, Glanders, melioidosis, meningitis, septicaemia, pneumonia, enteric infections and urinary tract infections, food poisoning, chest infections, typhoid fever, Malta disease, blood stream infections, shigellosis, salmonelliosis, black death and gastroenteritis, hitra disease in Atlantic salmon, haemmorrhagic septicaemia in marine fish, spontaneous abortion in pigs and sheep, red mouth disease in rainbow trout, and cranial and eye lesions in fish.

29. The use according to any one of claims 22-26 wherein said antibiotic is erythromycin A, rifampin, tetracycline, chloramphenicol, norfloxacin, nalidixic acid or penicillin G.

30. Use of a method according to any one of claims 1 to 8 for the inhibition of biofilms.

31. A method of detection of quorum sensing bacteria comprising;

(i) probing a sample of bacteria with a labelled antibody according to claim 13 or claim 14, and

(ii) detecting the presence of antibody attached to bacteria.

32. A method of detection of quorum sensing bacteria comprising;

(i) probing a sample of bacteria with a first antibody according to any one of claims 7 to 10,

(ii) probing said first antibody with a second, labelled antibody, and

(iii) detecting the presence of the second antibody attached to bacteria.

33. A method of detecting antibodies specific for LuxR or a homologue thereof comprising:

(i) probing a sample of serum with whole bacterial cells expressing whole or a fragment of LuxR or a homologue thereof,

(ii) probing the bacteria/antibody complex with a second, labelled antibody, and

(iii) detecting the presence of the second antibody attached to the bacteria/first antibody complex.

34. A method of detecting antibodies specific for LuxR or a homologue thereof comprising:

(i) probing a sample of serum with purified LuxR or a fragment or homologue thereof,

(ii) probing the bacterial protein/antibody complex with a second, labelled antibody, and

(iii) detecting the presence of the second antibody attached to the bacteria/first antibody complex.

35. A kit comprising an antibody according to any one of claims 8 to 14.

36. A kit comprising a fragment of LuxR or a fragment of a homologue of LuxR for the detection of antibodies thereto.

37. A method of inhibiting quorum sensing comprising sequestering quorum sensing signal molecules.

38. Use of an antibody according to claim 12 in the method of claim 37.

39. A kit comprising for simultaneous, separate or sequential use (i) LuxR, a homologue of LuxR, a fragment of LuxR or a homologue of LuxR, a nucleic acid encoding one of these polypeptides, an antibody, a pharmaceutical composition or a vaccine composition according to the invention and (ii) an antibiotic.